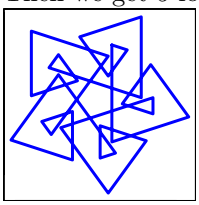
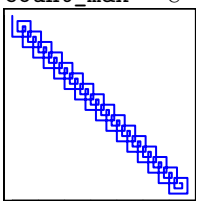
Name: Date:

How many loops will my countdown pattern have?

- Two key parameters that dictate the countdown pattern:
  - `turn_deg`: The turn angle (in degrees)
  - `count_max`: The countdown maximum (which is also number of segments per loop)
- From those, **can we predict how many loops are formed?**
- For example, if we set the parameters to the values below:
  - `turn_deg` = 108° which is equivalent to $\frac{3}{10}$ full turn
  - `count_max` = 6
  - Then we get 5 loops:



- Sometimes we can get infinity loops. For example:
  - `turn_deg` = 90° which is equivalent to $\frac{1}{4}$ full turn
  - `count_max` = 8



  - Notice, this pattern would continue forever, making `loops`=∞.
- As suggested before, it'll be useful to use **fraction of a full turn** instead of degrees. Some examples:

$$120^\circ = \frac{1}{3} \text{ full turn}$$

$$90^\circ = \frac{1}{4} \text{ full turn}$$

$$72^\circ = \frac{1}{5} \text{ full turn}$$

$$144^\circ = \frac{2}{5} \text{ full turn}$$

$$60^\circ = \frac{1}{6} \text{ full turn}$$

- In our new Scratch project, we will set the numerator and denominator of the turn fraction.
  - https://scratch.mit.edu/projects/1216750917
  - `turn_a` is the numerator (top of fraction)
  - `turn_b` is the denominator (bottom of fraction)
  - The computer will calculate `turn_deg` for you.

$$\texttt{turn\_deg} = 360^\circ \cdot \frac{\texttt{turn\_a}}{\texttt{turn\_b}}$$

- In order to find the prediction rule, record some results in tables.

turn_a	turn_b	count_max	turn_deg	loops
1	1	1		
1	1	2		
1	1	3		
1	1	4		
1	1	5		
1	1	6		
1	1	7		
1	1	8		
1	1	9		
1	1	10		